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EDITORIAL.

EVER since the introduction of anæsthesia into the practice of surgery there has been a marked contrast between its employment in Great Britain and America and that usual in the continental countries. No doubt this difference in behaviour was due mainly to the origination of anæsthesia being placed in English speaking lands. Partly it was due to a national difference in outlook on the part of surgeons. The English speaking surgeon takes up a more human and less coldly scientific attitude towards his patient than does his continental confrère. As a consequence he appreciated more eagerly and employed more fully than did the latter the pain-saving device of anæsthesia. Later on, the extended possibilities of anæsthesia and the elaboration of technique and multiplication of drugs and methods led in the English speaking countries to the formation of a class of practitioner who devoted himself entirely to the study of and practice in anæsthesia. Until quite lately medical men of this kind have been absent from the continental countries. The consequence was that surgeons devoted themselves to perfecting local methods on which they were forced mainly to rely. Lately, however, there has been in Germany a remarkable development of interest in general anæsthetics and several men of repute are lending themselves to this branch of practice. Foremost among these are Schmidt and Von der Porten of Hamburg and it is on that account that we feel that our readers will not grudge the space which we have allotted in this number to a contribution from the latter gentleman, even though the matter of his article is of educational rather than of scientific interest.

SPINAL ANALGESIA—A NEW METHOD AND A NEW DRUG—PERCAINE.

By W. Howard Jones, M.B., B.S., (Lond.).

Surgeon Anæsthetist to Charing Cross Hospital; Senior Anæsthetist to the London Temperance Hospital, etc.

Continued from page 113 of the April Issue.

The Administration.

Equipment.

A 20 c.c. capacity Record syringe, some fine rustless steel needles only a small fraction over 1 mm. in diameter (1.2), with the points ground to a short bevel and containing no stylette, and a barrel length of 8.5 or 9 centimetres beyond the socket.

A 2 c.c. Record syringe for the administration of ephedrin 1-1½ grains which is given in every case, and to blow out a needle if one should become blocked.

These instruments are placed in a small tray and the whole put in the sterilizer and left until required. They should remain in the sterilizer all the time between cases.

In use the tray serves as a sterile base from which the instruments must not be allowed to wander.

The distal three-quarters of the needle should not be touched with the fingers and the butt end should be held like a dart.

If the point is sharp puncture of the skin is not difficult and is effected by a sudden stab hardly noticed by the patient.

Percaine solutions.

These have been freshly prepared and should be just cooled to body temperature from recent boiling.

They may also be taken from sterile ampoules containing 10 to 20 c.c. of solution 1-1000, which can be warmed by placing the ampoules in hot water.

From this 1-1000 solution, the higher dilutions of 1-1500 and 1-2000 can be made in the syringe by adding boiled normal saline or if a definite hypo-baric solution is preferred distilled water.

For hospital use I prefer separate flasks containing the following solutions:—

Normal saline S.G. 1.006. 1-2000: 1-1500 (ampoules 1-1000).

I have used ampoules more than two months old and the solution appeared to be unchanged.

0.5*per cent saline* S.G.1.003. 1-1500 hypo-baric.

This can be used if the Trendelenberg position is to be immediate.

Similar hypo-baric solutions can be made in all strengths to suit the requirements of individual cases.

Choice of solutions.

The duration of analgesia will be proportional to the concentration of percaine.

For an operation of about three-quarters of an hour the 1-2000 will probably be efficient, for an hour or more 1-1500 and up to two hours and beyond 1-1000.

I am fortunate in not having been able so far to prove the utmost limit of the 1-1000 solution.

These times are only rough approximations, and unless the posterior roots are well soaked, a preponderating anterior root block will be demonstrated by an early return of sensation.

Use 0.5 per cent saline solution if the Trendelenberg position is to be immediate if the injection is to be of large volume, for if normal saline is used time must be allowed for sodium chloride to be absorbed .

The injection.

Before washing up the spine should be measured. The most prominent spine is the first thoraric, and a measurement is taken either from this or the seventh cervical to the inter-iliac line, with the body in full flexion. A variation of about four inches has been found. There can be no accuracy in this measurement, it serves only as an indication whether the dural tube is relatively long or short.

The first injection of 15 c.c. gave a good splanchnic block, but on subsequent occasions this amount of fluid sometimes failed to pass D7. This variation led to the measurement of spines and the injection of increasing amounts up to 20 c.c. which has been the maximum.

My present opinion is that with practice the smaller volumes are becoming more uniformly successful, but each administrator must explore these volumes for himself.

In no instance has a cervical nerve root been reached by the injection and D2 or D3 may be regarded as a successful level to reach for a splachnic block.

Table of dosage.

15–18 cubic centimetres - - - -	between	D2 and D5 down.
12 cubic centimetres - - - -	about	D7 or D8 down.
10 cubic centimetres - - - -	about	D10 down.
6 cubic centimetres, caudal block,	no advance on the dorsal nerves.	

Smaller quantities of stronger solutions are applicable for caudal blocks.

The maximum amount of percaine in the above dosage is 18 milligrammes in 1-1000 solution.

15 cubic centimetres of 1-2000 solution contain only $7\frac{1}{2}$ milligrammes of percaine.

Contrast these figures with the 200 milligrammes maximum allowance for tissue infiltration and the relative non-toxicity of these spinal injections becomes apparent.

There is no need to be nigardly with dilute percaine solutions and to attempt to find fine limits, I find that 15 c.c. 1-2000 makes appendicectomy a very comfortable proceeding, free from unpleasant sensation even on mesenteric traction, though no doubt 12 c.c. would rise to a sufficient level in most cases.

Site of puncture.

All thoracic nerve root injections are introduced between L1 and L2.

For simple caudal block, the sacral and coccygeal plexus distribution is attacked between L4 and L5, and the lumbar

plexus between L1 and L2. With hypo-baric solutions these blocks can be strictly limited.

Puncture is made in the right lateral position in the usual manner, and when cerebro-spinal fluid flows the needle is pushed in about 1 mm. further to make sure that the bevel is quite through.

Only a few drops of cerebral-spinal fluid are allowed to escape.

The syringe charged with the chosen volume is connected, and care must be taken not to displace the needle at this stage.

The injection is then commenced. The first portion goes in very easily but sooner or later a sense of resistance will be felt, and if thumb pressure is released the piston may be pushed out a short way.

In some cases little or no pressure seems to develop. When pressure is felt a pause is made to allow the fluid time to push upward, and a pause between each two cubic centimetres is, I think, good practice.

Experience appears to result in more certainty in reaching the required level.

The needle is not immediately withdrawn, but held for a short time to prevent too much leakage through the dural puncture.

After withdrawal the patient is turned flat on his face to soak the posterior roots for about 5-10 minutes or even longer if the operation is likely to be prolonged.

When the patient is finally put on his back analgesia may have developed but not abdominal muscular paralysis, but this soon follows when the anterior roots meet the solution.

The cauda equina gets the full blast of the injection and paralysis in the legs has probably already developed.

The increased pressure seems to be unnoticed by the patient. Only two in the series have complained of headache immediately after the injection due, no doubt, to too rapid administration.

Testing the result.

Inability to raise the legs proves that the lumbar plexus

is blocked. The abdomen is then uncovered and the patient is asked to cough, and afterwards to sit up.

If the abdominal muscles are paralysed coughing is difficult and ineffectual, and the patient is unable to raise his thorax.

Any deficiency in paralysis of the upper segments of the rectus at once becomes apparent, for the active portion is seen to draw up the paralysed lower part of the abdominal wall and a line of demarcation can be estimated.

A skin clip is now applied gently but with progressive firmness unseen by the patient in the skin area D_4 and his face is watched for any record of this test. If this is satisfactory splanchnic block may be assumed.

General Results of the Injection.

Blood pressure.

There is a fall of blood pressure due to vaso-motor paralysis, but the fall is not nearly so great as it is with large doses of novocaine or stovaine, and no sphygmomanometer is required to demonstrate this fact.

The patient's colour and appearance give eloquent testimony to the great superiority of these dilute percaine solutions over novocaine and stovaine, and the pulse in many cases appears to be unaffected.

The explanation is that this relative non-toxicity is not a property of the pharmacological action of percain but is due to its high dilution, which makes sudden absorption into the blood stream impossible.

In order to demonstrate this I injected parallel cases with 15 cubic centimetres of 1 per cent novocaine in 0.5 per cent saline. In each case vomiting occurred within 10 minutes and there was a severe fall of blood pressure with extreme pallor, as is often the case with large doses of novocaine.

This collapse is due to two factors.

1. Vasomotor paralysis, the effect of which will be the same whatever drug is used.

2. Sudden absorption into the blood stream of novocaine, which is by far the greater factor.

This absorption is due to the greater concentration of the

novocaine solutions which are required for effective results. The percaine patient escapes this general toxæmia.

Vomiting.

Spontaneous vomiting is rarely seen on the operating table, for the above mentioned reason.

Handling the stomach is an unavoidable cause of vomiting which usually does not last long, but is usually accompanied by some fall of blood pressure, and is a source of great discomfort to the patient, the more so because it is ineffectual.

Patients derive much comfort from a sympathetic explanation that this sickness will not last long and is due only to a little bile on the stomach, a statement which is often nothing but the truth, for the surgeon has just proved the bile duct by discharging the contents of the gall bladder into the duodenum.

A certain amount of pain during high explorations is unavoidable, especially when the surgeon is attempting to disturb an unwilling viscus, for neither the vagus or phrenic paths is blocked.

An interesting demonstration of phrenic referred pain occurred when Mr. Jennings Marshall poured hot flavine solution into the abdomen of a patient in the light Trendelenberg position. He at once called out that his neck had "gone stiff."

MANAGEMENT OF THE CASE.

The table is given a gentle tilt to prevent undue effects of the vasomotor paralysis.

The head rest is raised one notch for the patient's comfort. A stream of air from a motor pump is directed so that the air around his face is kept moving, otherwise he finds the stuffy atmosphere of the hot theatre unbearable. An occasional sponging of the face with cold water is very gratefully accepted for the same reason, and is moreover a mild respiratory stimulant.

A confident and reassuring attitude in the anæsthetist will be reflected in the patient, while loud discussions about his pathological abnormalities will similarly have a depressing effect.

The screen should always have an under layer of mackintosh for an occasional auto-arterial display on the towel in front of his face is not likely to be taken as a good omen by a sensitive patient. Sips of cold water may be given from time to time and a little brandy from a spoon has a greater psychological than pharmalogical effect in some patients.

Blood pressure may be recorded at regular intervals if desired, but the procedure is disturbing to the patient and gives little information beyond that afforded by clinical experience.

The pulse respiration, and colour of the patient should be carefully watched, especially towards the end of a long operation, for the possibility of central respiratory failure must not be forgotten.

Respiratory Failure.

In the background of every ambitious administration lurks the bogey of phrenic motor paralysis.

The preponderating posterior root paralysis and the diminishing concentration from below upwards experienced with hyperbaric solutions of novocaine spread by gravitational diffusion, enable the phrenic motor roots to escape even when analgesia develops in the skin area of the cervical plexus.

No such immunity can be expected with percaine solutions but with the volume dosage recommended in the average patient, the fourth cervical roots are not likely to be reached.

But paralysis of the phrenics is by no means the most likely cause of an arrest of the breathing under high thoracic nerve root block.

The explanation of this statement is physiological.

A consequence of the paralysis of the intercostal nerves which will be more marked with hypo-baric solutions of percaine than with the old novocaine methods, owing to the preponderating anterior root effect, is that an important division of the respiratory mechanism is put out of action leaving the diaphragm to carry on by itself. This virtually amounts to an impediment to the breathing and is likely to be a cause of fatigue of the respiratory centre. It is known that the lung does not expand uniformly on inspiration, but

that it opens out gradually from the periphery. With the diaphragm alone operating, lung expansion takes place chiefly in the lower lobes and very little in the upper.

The result is a tendency to anoxæmia due to imperfect lung ventilation. Anoxæmia is a cause of increased fatigue of the centre and shallow breathing, which again accentuates the tendency to anoxæmia. A vicious circle is thus established which, unless broken, inevitably leads to respiratory arrest. (Haldane).

If preliminary narcotic drugs have been given and especially if chloroform or much ether is super-added, events may move much more rapidly. All narcotics and all anæsthetics eventually depress the excitability of the centre for its normal stimulus carbon dioxide. Thus a narcotic centre with diminished excitability, imperfect lung ventilation, central fatigue, shallow breathing and anoxæmia all tend to bring about a progressive decrease in the amplitude of respiration, and the operation of a more potent vicious circle ending in arrest.

The following case is illustrative.

A young man, the subject of gastric operation by Mr. Jennings Marshall, under a well developed splanchnic block with percaine which had reached the second or third dorsal roots, towards the end of the operation which had then been in progress about three quarters of an hour, showed signs of distress, his colour was not good, and he said that he felt that he could not breathe. His central respiratory failure was so marked that his jaw was being jerked downwards with each inspiration. He was told that he was tired and that he was going to be put to sleep.

Applying a gas bag containing a high percentage mixture of oxygen with nitrous oxide to break down the vicious circle, and carbon dioxide in higher percentage to stimulate the centre, he was started re-breathing, The respiration soon lost its jerky character, and in a few minutes he was into an ordinary gas and oxygen administration with vigorous breathing which continued until the finish.

This man was not narcotised, and therefore responded easily, but if a centre is badly narcotised as well as fatigued, carbon-dioxide may be unavailing and mechanical artificial

respiration the only hope. Morphia and scopolamine are suspects in this method and so are all narcotics.

When a combined general anæsthetic is given the closed method with oxygen is an insurance against respiratory failure and should be the method of choice, especially if a preliminary narcotic has been thought necessary.

In an emergency carbon-dioxide and oxygen are, of course, correct treatment, but it must be remembered that carbon-dioxide in high percentage is a dangerous narcotic and very irritating to the air passages.

An increase of three per cent in the inspired air is sufficient to increase lung ventilation 100 per cent if the centre is able to respond. If the centre is fatigued and narcotic, it may be useless. Every patient is a carbon-dioxide factory and those who use the closed method will seldom require the manufactured article. I believe that much of the carbon-dioxide now being discharged from sparklet bulbs could be used to greater advantage in a beverage after the operation.

The chief indications for a combined general anæsthesia are to be found in the mental make-up of the patient, and the necessity for adopting the Trendelenberg position which is not easily tolerated by the conscious subject.

Failures.

Percaine, the strongest drug of its kind ever produced, will never fail to produce analgesia or muscular relaxation if applied to nerve trunks or roots.

Failure means faulty administration.

Causes.

1. A misdirected injection.

2. A miscalculated injection, or failure to reach the required level.

3. Anterior root block resulting from hypo-baric solutions in the dorsal decubitus or insufficient time allowance in the ventral.

After Effects.

"Meningism."

1. *Headache.* The usual spinal headache has followed in several cases sometimes severe and lasting several days.

This headache has no peculiar relationship to percaine; one of the worst followed one of the parallel injections of novocaine referred to above.

2. *Vomiting*. Several cases of severe vomiting occurred early in the series but excessive vomiting now seems to have disappeared although mild attacks occasionally follow. Manipulation of the testicle and ovaries may have had a casual relationship in some cases.

The incidence of headache and vomiting has no direct relationship to the amount of percaine injected.

The improvement following the early cases may be due to the use of solutions freshly prepared for each session. Only the purest sodium chloride should be used. Ephedrin in large doses is also a possible factor in unpleasant after-effects. Ephedrin is stated by the Resident Staff at Charing Cross Hospital to be a frequent cure for the spinal headache. If this proves on prolonged trial to be the case, it is a great discovery.

There have been no disastrous consequences as the result of percaine injections. On the contrary, the condition of the patient on the operating table shows a very marked improvement over the results obtained with novocaine and stovaine, while $7\frac{1}{2}$ milligrammes of percaine will give a longer analgesia

Conclusions.

Percaine seems likely to increase the range of usefulness of spinal analgesia.

While the statements in this paper must be regarded as an early report of a prolonged investigation only just begun, a very favourable experience of it justifies a confidence that a general use will quickly demonstrate its superiority over its predecessors.

The method of direct injection advocated is the simplest possible technique; results in a more equal concentration of drug over the nerve roots involved, with correspondingly more certain results, and places spinal analgesia almost on the same footing as local infiltration.

It is also applicable in the administration of novocaine though it is possible that drug may soon be obsolete

As a final recommendation with regard to solutions my present opinion is, that owing to the uncertainty of the specific gravity relationship of normal saline solutions to the cerebro-spinal fluid the 0.5 per cent solution S.G. 1.003 in all strengths may prove to be the most practical in use.

With them the technique of the grill-room chef is essential, and while the patient's cervical roots appear to be safe in the prone position, when turned on his back a slight Trendelenberg position should be adopted as a precaution.

With these hypo-baric solutions in small quantity, strictly limited caudal blocks can be obtained and the higher concentrations are applicable.

Spinal analgesia tends to become more and more popular with patients.

This is exemplified by a man who said to me :—

The last time I was 'ere, Sir, you gave me the lumbar punch, and I'd be glad if you was to give me another one if you don't mind."

I have to thank Mr. Daniel, Mr. Lake, and Mr. Marshall of Charing Cross Hospital, and Mr. McClure of the London Temperance Hospital for the very favourable conditions under which this investigation is being carried out.

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ANÆSTHESIA AND MIDWIFERY.

THE existence at the present moment of two separate funds, each started solely with the object of providing money in order that women should have anæsthetics for their confinements, is a phenomenon of much interest to all of us who are engaged in anæsthetic practice. The object of these two philanthropic, or should it rather be philgynic?, efforts, for which Mrs. Baldwin and Lady Balfour of Burleigh are mainly responsible, has met with both adverse criticism and support in the medical press. We do not propose to deal with the social side of the matter at all, beyond remarking that the ladies mentioned must themseves, and they are both experienced and intelligent matrons, be greatly impressed with a deficiency in the service which they are seeking to strengthen. The purely medical side of the matter is one which concerns us intimately. The question may be fairly stated in this way; is it true that the maternity service of this country could be improved by a provision of anæsthetics which is at present impossible or is at any rate not forthcoming? Are there numerous instances in which, if skilled administration of anæsthetics were possible, it would be greatly to the patient's benefit and would be eagerly adopted by the obstetrician? There can be little doubt that the answer to this question by anyone who has a wide experience of present conditions is "yes." If you merely take good class private practice, every gynæcologist will tell you that it is only financial considerations that prevents him from calling in an anæsthetist over and over again. The same thing is true on a huge scale in the country at large where the attending obstetrician is a man in general practice, or a midwife.

The chief reason in all these instances why an anæsthetic is not administered, or if administered is not given by a medical man, is a reason not of a medical but of a financial or other kind. The gynæcologist or the practitioner con-

ducting the labour knows that either there is no money to pay for anæsthetic help of the kind he would choose, or that the required person is too far away to be obtainable. In the practice of lying-in hospitals it is obvious that the same reasons cannot prevail, or at any rate not to anything like the same extent. Here the reason for the non-employment of anæsthetics to a fuller extent has, we believe, been only partly one of deficient personnel. It has been partly one of custom and a lack of full awakening to the possibilities of anæsthesia in labour when properly managed by expert hands. At all events it is a notable fact that since the funds have been started to which we have alluded, two resident anæsthetists have been appointed to one of the chief lying-in hospitals in London. We doubt whether purely financial considerations alone prevented this step from being taken before. The funds have supplied the finance it is true, but their coming into being has also applied the spur of public opinion to the slightly dormant obstretric conscience.

Some person who can give the anæsthetic properly and who is fully conversant with its powers to delay or to facilitate the progress of labour is as necessary for the proper conduct of a surgical operation under general anæsthesia. conduct of a surgical operation under pleural anæsthesia For the average normal labour his presence is not so essential but it facilitates the work of the obstetrician and enormously increases the comfort and the safety of the patient. We believe that these statements are true but their truth is not so widely recognised as it should be.

Midwifery itself waited long for recognition and for admission to equality with her sisters, medicine and surgery proper. Anæsthetics have fairly quickly established a reputable position among the specialties and the value of the skilled anæsthetist in all branches of surgery is fully realised by the surgeon and even to some extent by the lay public. The same does not hold good of midwifery. Here the traditional attitude which for so long kept the accoucheur in his inferior position seems to taint him with regard to his colleague. Just as it was so long held that labour being a natural process inflicted on women, therefore the person in attendance required

no practical training or skill, so to-day many gynæcologists seem to hold that although their skill and knowledge may be essential for the safe conduct of a confinement, yet the pains of this process being natural they need either no quelling at all or only that which can be casually achieved by an assistant untrained in anæsthetics or by the occasional administrations of the obstetrician or of the patient herself. This is a state of affairs that will appear ludicrous in a few years' time. It is one of the duties of the anæsthetists to hasten the advent of that more enlightened age. The practical problem is one of enormous difficulty, and we can attempt here no suggestion of how anæsthesia is to be brought safely to the thousands of childbirths conducted in poor circumstances throughout the land. Before that can be brought about there must be a much wider and stronger public opinion as to its desirability than now exists, and that opinion must be created from medical authority. It is as a small step in this direction and to foster the efforts of our colleagues in the matter that these lines are written.

L. O. A.

ANÆSTHESIA IN ORTHOPÆDIC SURGERY.

By HUGH R. PHILLIPS, M.D., (Edin.).

Anæsthetist, St. Vincent's Orthopædic; St. John and St. Elizabeth; Freemasons' and Italian Hospitals. Late Anæthetist, Hospital for Sick Children, Gt. Ormond St.

THE production of anæsthesia for orthæpedic cases may roughly be divided into four groups:—

(*a*) For manipulative work.
(*b*) For reduction of dislocations of the bigger joints; reduction of displaced cartilages of the knee, subcutaneous tenotomies.
(*c*) For heavy wrenchings and osteoclases.
(*d*) For open operations.

(*a*) In manipulative work it is a common thing to be asked to produce brief relaxation of a patient's muscles in a surgeon's own consulting room, where it would be inconvenient for him to lie up for some hours. In such cases a gas anæsthesia similar to that which is necessary for extraction of teeth may suffice. An ordinary oral administration should be enough, but it is advisable to use an apparatus with which gas can be delivered under pressure in order to obtain the necessary short period of complete relaxation. This method is the one most favoured by osteopaths and bonesetters. Its application is limited to cases in which adhesions, which are not very tough, are to be broken down: conditions such as a Colles fracture or dislocation of a smaller joint. Such procedure may succeed when muscular antagonism is not too great, but there are cases where relaxation has to be continued for somewhat longer in order to allow the surgeon to get his reposition. The objection, therefore, to this form of anæsthesia is that instead of relaxation, one frequently gets factitation and spasm which defeat the object. It is particularly unreliable in the reduction of cartilages of the knee,

though it may be sufficient; in muscular subjects it may often fail.

If the patient is in a nursing home or his own house, a preliminary injection of morphia, atropine and scopolamine is advantageous, and helps to do away with a possible spasm, while the use of oxygen with nitrous oxide given with one of the numerous forms of elaborate apparatus such as a McKesson enables one to prolong the anæsthetic indefinitely.

If nitrous oxide, with or without oxygen, is given, much depends upon the manipulative skill of the surgeon, as he must be able to seize upon the precise moment when the patient becomes limp (a state lasting in many cases for only a few seconds) and complete his operation without delay.

In young children gas by itself is contra-indicated in these short operations, because the period of unconsciousness is so very short. In cases where it is doubtful how long the manipulation may take, chloride of ethyl is useful, preferably one of the preparations containing eau-de-Cologne and given on an open mask, or by the semi-open method using Denis Brown's inhaler.

(*b*) For reduction of dislocations of the bigger joints: for replacement of knee cartilages: for breaking down tough adhesions of long standing and manipulation of the back a longer and deeper anæsthesia is required. Induction by ethyl chloride (or if preferred nitrous oxide) followed by ether or mixture combined with oxygen is best. An excellent mixture for use with adults is one part of chloroform to eight or ten of ether: in children pure ether is safer. In very hot weather chloroform can be used with advantage, as so much less anæsthetic is pushed into the patient; it can be used also when dealing with old people in cold weather to lessen the chance of bronchial trouble. Oxygen should be used with the chloroform.

Gas and oxygen may be used in this class of case, but when there is much handling or when considerable force has to be used, it is not always satisfactory.

Subcutaneous tenotomies require a short and light anæsthetic unless at the same time there is wrenching and stretching of muscles. In simple tenotomies in adults gas-

oxygen may suffice with a small amount of ether, but usually the ether must be pushed to procure sufficient relaxation. For children ethyl chloride followed by ether and oxygen is best.

(*c*)) For heavy wrenchings and osteoclases the amount of force used is so great that it tends to rouse the patient unless he is deeply anæsthetised. Except in children a preliminary injection of morphia or omnopon is advisable, and ether or mixture with oxygen after induction by ethyl chloride gives satisfactory results. As soon as the patient returns to bed bromide, aspirin, brandy and glucose by rectum will keep the patient narcotised. This after treatment is very important, and may be repeated at intervals if necessary, in those cases where the limbs are put up in a strained position.

(*d*) In open operations the choice of an anæsthetic depends largely upon the age of the patient. Many open operations require complete relaxation of the muscles, especially in transplantation of tendons, and wiring or plating of fractures. In such cases it is of very little use to attempt to obtain sufficient depth of anæsthesia with gas and oxygen alone, owing to the depth being often fluctuating, and other methods must be employed, either to supplement the gas and oxygen with ether or mixture or to use other means.

In adults a preliminary injection of a full dose of morphia or omnopon with atropine and scopolamine, followed by gas and oxygen with ether or mixture gives good results. The use of paraldehyde by rectum an hour beforehand in addition to the hypodermic injection is useful in nervous patients, but its effect is uncertain, as it may produce excitement. (Vide *B.M.J.* Feb. 15th, 1930).

I have not used avertin in orthopædic work at all. Children are more amenable to paraldehyde, and its use is as a rule most satisfactory. It is wise not to administer this when the operation is in the region of the pelvis, hip or thigh, as when the sphincters are relaxed the paraldehyde may not be completely absorbed, and if evacuated will soil the area of operation.

Spinal anæsthetics in small doses, such as $^{2}/_{5}$th to $\frac{1}{2}$ c.c. of Billon's Stovaine, following a hypodermic injection are very satisfactory in operations below the umbilicus. I usually give

a light general, usually gas and oxygen, because it is easier to pass the needle and it is more pleasant for the surgeon and patient, if the latter is unconscious.

Intra-tracheal insufflation seems to me to be unnecessary except perhaps in cases of jaw injuries.

In the majority of open operations the surest and simplest method is to use open ether or mixture with oxygen, except in special cases, after induction with ethyl chloride.

There is a class of case in children, involving severe shock, exemplified by Albee's spinal bone graft and the open operation for making a new acetabular lip. A most important feature in these anæsthetics is the avoidance of congestion, as it has been noticed that, if the blood gets dark at any stage of the operation even for a short time, the after condition of that child frequently gives cause for anxiety for many hours.

As a preliminary in these cases involving big shock I used paraldehyde for a long time, but have given it up in favour of morphia and atropine. The dose I use is Morph, Sulph. gr. 1/20 and atropine gr. 1/200, for children from one to four years old, thence the dose is gradually increased. After this gas and oxygen is given, which is usually sufficient except for occasional whiffs of ether at certain stages of the operation. Usually a subcutaneous saline is kept going throughout the proceedings.

In conclusion the chief difficulty in giving an anæsthetic for orthorpædic operations is to produce sufficient relaxation with a minimum of anæsthetic drugs.

THE HENRY HICKMAN MEMORIAL.

THE movement to establish a memorial to Henry Hill Hickman culminated on April 5th with the dedication of a memorial tablet in Bromfield Parish Church, Shropshire, and it is fitting that a brief account of the ceremony and the activities which led up to it should find a place in the pages of this Journal. The Section of Anæsthetics of the Royal Society of Medicine, and Dr. Cecil Hughes who was its president when the idea was first mooted, deserve especial credit for the worthy manner in which the English pioneer of inhalation anæsthetics has at last received formal recognition, but their efforts would have met with less success, probably, if they had not been so well supported by two presidents of the Society, Sir St. Clair Thomson and Lord Dawson.

It was through the Rev. Prebendary F. W. Joyce that the attention of the Royal Society of Medicine was brought to the grave of Henry Hill Hickman in Bromfield Churchyard, Ludlow, Shropshire. A fund was then opened under the auspices of Lord Dawson, Sir. St. Clair Thomson, Mr. Warren Low and Dr. Cecil Hughes. The contributors included besides the Royal Society of Medicine and its Anæsthetic Section, The Association of Surgeons of Great Britain, the Canadian Medical Association, the Faculties of Medicine of the Universities of Birmingham and of Durham, many other medical bodies and a number of individial medical practitioners including, of course, many anæsthetists. The full list can be found in the British Medical Journal of March 28th, 1930. Over £250 having been collected, Hickman's family grave and tombstone were restored and renewed, and a tablet engraved by Mr. Eric Gill was unveiled in Bromfield Church by Sir St. Clair Thomson, late President of the Royal Society of Medicine and dedicated by the Bishop of Hereford on April 5th last. The tablet bears the inscription :—

"A.M.D.C. Henry Hill Hickman, Member of the Royal College of Surgeons. Born at Lady Halton, in this parish, January 27th, baptised in this church, January 30th, 1800. Died at Tenbury, April 2nd, buried in this Churchyard, April 5th, 1830. This tablet is placed here at the initiative of the Section of Anæsthetics of the Royal Society of Medicine as a centenary tribute to the earliest known pioneer of anæsthetics by inhalation. "Honour a physician with the honour due into him.' A. D. 1930."

On the following Sunday the Rev. Prebendary F. W. Joyce preached in the church a sermon in memory of Hickman. Previously on April 2nd, exactly one hundred years after Hickman's death, a memorial gathering had been held at the Wellcome Historical Medical Museum. Here the authorities of the museum received the Members of the Anæsthetic Section, their President, Mr. R. E. Apperly and a large number of distinguished medical men including Lord Moyniham, President of the Royal College of Surgeons, Sir Farquhar Buzzard, Sir Holburt Waring and many others. Two of Hickman's grand-daughters were also present.

The authentic records of Hickman's experiments and demonstrations, his portrait and a number of personal relics were exhibited. No place could have been more appropriate than this museum for a meeting in Hickman's honour, for it was Dr. Wellcome's researches many years ago which first unearthed the evidence on which Hickman's claim to fame as a pioneer in Anæsthesia is now firmly established. The company was addressed by Lord Dawson who threw a light over the history of the early years of endeavours in anæsthetic work and over Hickman's position in that work. This address will appear in the "Proceedings of the Royal Society of Medicine" and our readers can also find a good report of it in the *Lancet* and the *British Medical Journal* of April 12th last.

TWO INSTANCES OF HYPNOTIC SUGGESTION (?)

By A. W. Matthew, M.R.C.S., L.R.C.P.

Hon. Anæsthetist and Lecturer on Anæsthetics, St. Mary's Hospital, London.

THE following two cases have occurred in my practice within six months of each other, and present such similarity of detail that it appears to be worth while reporting them, if only with the object of sparing others engaged in the administration of anæsthetics the extreme mental distress they entail when met unexpectedly.

Case No. 1.

A girl aged about 23 years, for tonsillectomy. This patient was of an extremely nervous temperament. I visited her the evening before operation and found that she was terrified of the anæsthetic and dreaded the loss of consciousness more than anything else. By dint of encouragement and a detailed explanation of the anæsthetic technique, I managed to extract a promise from her that she would do as I told her. I took great pains to impress upon her that the anæsthetic would make her ears "buzz" and that she was then to "go to sleep."

She was given a hypodermic injection of atropin gr. 1/100 45 minutes before the time of operation. She entered the operating theatre without any sign of the terror that she had shown the previous day, and submitted quite calmly to the administration of a 50 per cent mixture of chloroform and ether on an open mask.

I then said "go to sleep."

Instantly her colour changed to an ashen grey, her pupils dilated, and the corneal reflex was absent.

The respiration was regular, unobstructed, but rather shallow.

The pulse was regular and unvarying at the rate of between 70 and 80 per minute.

I removed the anæsthetic mask at once and administered oxygen.

Her condition was unchanged at the end of approximately ten minutes, so I induced the surgeon to remove a tonsil with the object of stimulating her.

The tonsil was removed and, beyond the tiniest ooze, the bed showed no sign of hæmorrhage.

The other tonsil was then removed with a similar result.

Every effort was then concentrated upon trying to make the tonsillar beds bleed, but without success.

As a last resort the patient was turned on her side and the nasopharynx was curetted.

The effect of this procedure was dramatic.

Instantly her colour changed to normal, hæmorrhage commenced, and consciousness returned.

The hæmorrhage soon ceased, and she was returned to bed conscious but in a dazed condition.

She made an uninterrupted recovery.

The time that elapsed from the removal of the anæsthetic mask to the return of consciousness was about 30 minutes, and the amount of anæsthetic used was found to be exactly one drachm.

Case No. 2.

A man aged about 45 years for submucous resection of the nasal septum and reduction of the inferior turbinates.

This patient was not seen by me before entering the operating theatre.

The anæsthetic technique employed was the same in every detail as that in the first case.

The same dramatic change took place in the patient's colour on my telling him to "go to sleep."

With some difficulty, I induced the surgeon to operate at once.

In spite of the fact that, owing to an oversight, the nose had not been prepared in any way, only one strip of gauze was used for swabbing and this was just slightly stained with blood.

At the end of about 15 minutes, for no reason that I can suggest, his colour returned to normal, his nose commenced to bleed, he opened his eyes and asked "why am I still in the operating theatre?"

His recovery was uninterrupted.

The amount of anæsthetic mixture used was found to be just under two drachms.

The points of similarity in the two cases are :—

1. The dramatically instantaneous change of colour and loss of reflexes when told to "go to sleep."
2. The regular respiration of the somnolent type.
3. The regular and unvarying pulse.
4. The almost complete failure of the peripheral circulation.
5. The dramatically instantaneous return to normal.

There can be little doubt that the amount of anæsthetic used cannot be held responsible.

The condition appears to be closely allied to that of the cadaveric state of hypnotism.

ANÆSTHESIA AND THE MEDICAL STUDENT IN GERMANY.

By Dr. Ernst von der Porten, Hamburg.

IT was in 1923 that I visited England, for the purpose of studying the local conditions relating to Anæsthesia. I had in advance gleaned sufficient information to know that in the realm of anæsthesia I should expect to find everything on lines quite different from those obtaining in Germany. That this information was not exaggerated was proved by the monumental evidence of what I actually found; that anæsthesia was a specialized department, and as such was represented in hospitals, in the universities, in courses and examinations by an "Anæsthetist's Society," and by a journal proper to it—things that were wholly unknown in Germany at that time.

It is fairly easy to imagine that this difference between two countries that had otherwise kept equal pace in medical science would furnish cause for serious consideration. More especially, as I had for a long time been sensible of a lamentable gap in the medical practice, though not in the science, attributable to the meagre attention devoted to anæsthesia in Germany.

As the result of my experience in England certain views I had held were now confirmed.

In the following year I took full advantage of an opportunity, in a paper before the medical association in Hamburg, to urge that measures be taken to fill the gap, to which I have already referred, by directing greater attention to anæsthesia as a medical activity entailing no small degree of responsibility. The response was that while a few of the surgical profession expressed their hearty concurrence the main body of my colleagues were either passive or active in their resistance.

I do not flatter myself that it was my agitation on this occasion which brought about the reaction that actually took effect in Germany in the following years, in the province of anæsthesia. For however dreary the circumstances as a whole, there were nevertheless to be found here and there extraordinarily valuable beginnings of scientific interest that were to decide the future. I have in mind the wonderful advance of the twilight sleep (Krönig/Gauss), and the spinal anæsthesia ((Bier), which, metaphorically speaking, compared with the otherwise sickly vegetation throughout the country, in so far as anæsthesia was concerned, were hothouse products of but two universities.

Although the colleges for Pharmacology provided for the theory of ether and chloroform anæsthesia, in the second half of the study of medicine, the students were, however, neither schooled in their practical application before the final examination nor were they examined in the subjects.

It was not until the year following his examination and preceding his being licensed to practice—the 'practical year' —that the young doctor was given opportunity to develop a practical knowledge of anæsthesia, of which but little came, at best. For, in point of fact, there was no Professor of Anæsthesia attached to any university, and as the main concern of the operating surgeon was limited by his express wish not to be disturbed by the anæsthetist, the teaching of the young doctor consisted of nothing more that his having a mask pressed into his hand with the injunction to 'drop.'

The administering of anæsthesia being regarded as a not very dignified activity, the older assistants were only too glad to unload this duty on their younger colleagues of approximately no experience. So that, as may be imagined, there was no dearth of grave happenings.

Rapidly and steadily conditions began to develop for the better, spurred on not a little by the resumption of international relations, the knowledge of conditions governing anæsthesia in England and America, and the attention directed to the exhaustive literature of the two countries.

Then, too, an equally vigorous stimulus was furnished

by the untiring efforts of the pharmaceutical industry, influenced by the Americans, to name no other than Luckhart, which, by its excellent new products, awoke the clinics to new interest in the question of anæsthesia.

With the coming of Narcelyn (Acetylene) which has taken the place of Ethylene in Germany, the surgeons were left no alternative but to place general anæsthesia in the hands of an experienced assistant who, in turn, found himself compelled to occupy himself seriously with the serious problem of anæsthesia. Anæsthesia had now to be studied and taught, and ceased to be the Cinderella under the heel of medical discipline.

Avertin and pernokton brought with them, too, a further perceptible influence, though in manner and direction different from that of acetylene.

The administering of both of them before the operation makes it technically possible for the surgeon himself to do this, thereby dispensing with the services of an anæsthetist; avertin being, as is well known, administered as an enema, while pernokton is injected into the blood-vessels.

Many different kinds of anæsthesia have been made use of in recent years, which though requiring the services of an experienced anæsthetist, nevertheless claim the interest of the surgeon and better preparation on the part of the student.

As a matter of fact, of the many German Universities, the University of Hamburg is the only one in which actual results have, so far, been gained, in that there is a course of anæsthesia for the medical student conducted by an assistant physician who is at the same time a member of the academic faculty.

I regard this fact, despite its being up to now an isolated case, as symptomatic of the progress made in Germany in recent years, from the point of view of anæsthesia. For though the course referred to above may at present be singular, a thorough knowledge of anæsthesia is required in almost all universities to stand the State examination. So that the young doctor finds it incumbent on him to make himself

acquainted with the various kinds of anæsthesia, in the so-called 'practical year,' before being licensed to practice.

By virtue of the great interest that attaches to the works of such men as Gaus, Rehn, Schmieden, and Sudeck, to mention but a few in the province of anæsthesia, it is a foregone conclusion that in their clinics a firm, basic knowledge is imparted to the students, who are thereby placed in a position to advance to a satisfactory technical proficiency.

On the ground that the course of study of the German student of medicine is so entirely different from that of the English student, it is not to be expected that the conditions in England governing anæsthesia would obtain in Germany. It is, moreover, a question whether the same conditions are warranted in Germany.

In the main, I regard a change of the order of the examinations as secondary to the spirit in which they are conducted.

And because of this opinion it would be gratifying to find among the majority of surgeons to-day the professional view and moral sense intensified in the direction of an appreciation of the acute poisoning and its consequences peculiar to anæsthesia; to find the consequences attributable to blunders in the employment of anæsthesia fairly generally recognized and conceded; to find every medical practitioner obtaining during the course of study, knowledge and proficiency, by the aid of which he is enabled in his capacity as anæsthetist to safeguard the patient entrusted to his care; in short, to find throughout Germany, anæsthesia respected as a medical activity carrying with it a great deal more than ordinary responsibility.

Frankly it is to be admitted that we are not yet that far. And, in justice, I cannot remain mute to the fact that there are in Germany, the larger cities not excluded, surgeons who, though otherwise irreproachable, continue to regard anæsthesia as a 'quantité négligeable,' to the extent at least of allowing it to be administered by trained nurses, attendants, or young assistants. On the score of this, it is not to be wondered at that the results turn out unsatisfactory.

Nevertheless, that which has been so far attained merits recognition as a forward movement in the march of progress.

Metaphorically speaking, the engine of interest has been 'cranked,' by automatic ignition the mechanism is 'geared,' and the road is ahead.

To use the words of our friend, McMechan, "Anæsthesia will come into its own" in Germany.

ABSTRACTS.

Experimental anœsthesia with avertin and with amytal. ***Medical Journal of Australia.*** April 19.

Adolph Bolliger and Kempson Maddox adopted rectal anæsthetics in the laboratory because of the frequency with which animals developed bronchopneumonia after inhalation anæsthesia. Finding Evaking's oil-ether technique too complicated they used avertin and also sodium isoamylethyl barbiturate (sodium amytal). They especially investigated the alleged contra-indication of nephritis towards avertin anæsthesia. So far as dogs are concerned they deny this contra-indication. In dealing with advanced renal insufficiency though, they find it desirable to diminish the dose slightly. The reduced tolerance they attribute to lowered resistance in general rather than to the insufficincy. They made a number of biochemical investigations and conclude that avertin has no material influence on the CO_2 combining power of the blood plasma. Nor is the blood sugar level or that of the inorganic phosphates of the blood plasma materially affected. These workers regard both avertin and sodium amytal as suitable anæsthetics for the laboratory.

Spinal anæsthesia. F. T. Romberger. ***American Journal of Surgery,*** April 1930.

Romberger's experiences with light and heavy novocaine solutions are particularly interesting when read alongside the observations of Howard-Jones which we published in our last number and have continued in the present one. The American observer confirms what Howard-Jones has so clearly pointed out, the enhanced anterior effect of light solutions leading to greater motor than sensory paralysis, so that for efficient sensory paralysis Howard-Jones places the patient on the face after the injection has been made. Romberger writes "with the light solution maximum loss of muscle movement and resultant relaxation occurs at the expense of a somewhat lessened extension of loss of pain sense, whereas when novocaine heavy is used loss of pain sense extends higher than does loss of muscle tone and relaxation." Romberger believes that a "slight Fowler pos'tion, even as much as 15°, may sometimes be employed to great advantage. If ephedrine is used in proper amounts these patients do not have pallor, sweats or cyanosis. Their blood pressure, pulse and colour

run along very normally, ... administer 100 mg. and do not hesitate to use 150 mg. if indicated."

Post-operative acidosis. Dr. Giovanni de Candia in *"Rassequa Internaz di Clin. E. Terep.*, Feb. 1930.

De Candia gives an elaborate acount of the many investigations into the subject of acidosis after operations and after anæsthetics. Then he details the results achieved by personal observation of thirty-five patients, men and women, the Van Slyke method of estimation being used. His conclusions are as follows, and differ fundamentally in one respect from the generally accepted view as to the causation of acidosis after operation. De Candia believes preliminary stimulation and purgation to be of no account in this respect.

1. After operative intervention carried out with anæsthesia there is a reduction of the alkaline reserve which is in direct relationship to the anæsthetic employed.

2. Chloroform narcosis and spinal anæsthesia show the same rate; but the acidosis of chloroform is much more marked than that produced by spinal anæsthesia. The latter is fugitive and twenty-four hours after operation the normal acid-base equilibrium is re-established. After chloroform the acidosis as revealed by reduction of the alkali reserve is much more durable and can be detected, although reduced, after 48 hours.

3. Ether narcosis shows a very different behaviour. The reduction of the alkaline reserve after the operation changes to an increase in twenty-four hours returning to the original value after 48 hours. Hypocapnia is t ransformed into hypercapnia, a primary acidosis into a secondary alkalosis.

4. Local anæsthesia with novocaine proves of no importance in the study of acid-base equilibrium after operations.

5. The duration of the anæsthesia and the type of operation have no influence on the behaviour of the acid-base equilibrium.

6. Pre-operative starvation, purgation, enemata are negligible factors in the etiology of post-operative acidosis. This is shown in our researches by cases of local anæsthesia in which extreme emptiness of the intestinal tract was desired and obtained with scrupulous care.

7. Local anæsthesia with novocaine is to be preferred as the form of anæsthesia in cases in which there is a state of acidosis at the time of operation.

8. Post-operative acidosis in general is a compensatory acidosis, the reduction of alkaline reserve is transitory and clinically negligible. At the worst it lasts 48–72 hours.

9. Determination of the alkaline reserve in the pre-operative period is a great aid to the surgeon, as it may reveal a latent acidosis

and put him on guard against a possible unfortunate post-operative development.

10. The method of Van Slyke and Cullen by its simplicity of execution deserves to be widely carried out.

Comparative value of splanchnic and spinal analgesia in the treatment of experimental ileus. OSCHNER, GAGE and CUTTING in *Archives of Surgery*, Vol. 20, No. 5, May 1930.

In a communication fifteen months ago the authors expressed the opinion that splanchnic analgesia was preferable to spinal from the point of view of safety to the patient. The present contribution contains a long discussion of the anatomic and physiological questions involved in the cure of ileus, and of the vagus and sympathetic nerve control of intestinal movement. The fall of blood pressure resulting from spinal analgesia was found to be two to three times as great as that from splanchnic analgesia. Increase in tone, as well as increase in intestinal movement, was noted after spinal analgesia. The increase in tone is less marked and of shorter duration than that occurring after splanchnic analgesia. The increase in intestinal movement is, however, as constant and persists as long as, if not longer than, that due to splanchnic analgesia. The authors find the use of nicotine in the treatment of intestinal obstruction to be contra-indicated because of its inefficiency in increasing intestinal movement and because it may raise the blood pressure to a dangerous extent. The chief conclusions arrived at are:—Splanchnic analgesia will be ineffective in those cases of mechanical obstruction in which this has not been previously relieved by surgery. Splanchnic analgesia should be used early. As experimental splanchnic analgesia produces no marked motor effect on the large intestine the insertion of a rectal tube and the administration of an enema will probably be of value in conjunction with the analgesia. The method of Kappis is almost universally the method of choice for the treatment of ileus. A. solution of 2 per cent percain hyperchlorite in physiological salt solution is recommended. Epinephrine, ephedrine and atropine are all to be avoided in conjunction with splanchnic analgesia.

Blood pressure determinations should be made before and after the introduction of an anæsthetic solution into the splanchnic area, since a fall in blood pressure is invariably found after successful splanchnic blocks.

The application of percain for anæsthesia of the urethra and bladder. O. A. SCHWARZ in *Deutsch Med. Woch.*, March 28, 1930.

After alluding to the danger of cocaine used locally on the urethro vesical mucous membrane, and the necessity for never employing any local agent while there is the least lesion of the urethral lining, the

author proceeds to demonstrate the virtues of percain in this connexion. It is the ability to produce anæsthesia when used in very dilute solution that particularly appeals to him in this local anæsthetic. Already in 1927 he came to the conclusion that with a 0.1 to 0.5 per cent solution one obtained an excellent and durable anæsthesia of the urethral mucous membrane and the same concentration was effective for the bladder. To 10 c.c. of the solution he added 5–8 drops of a 1 in 1,000 suprarenin. Anæsthesia appears after about five minutes but it is wise to wait fifteen before passing an instrument. Tablets of 0.05 percain are manufactured one of which dissolved in 50 c.c. distilled water gives the required solutions for on an average two or three urethral anæsthetics. The solution keeps about six weeks and can be resterilized by boiling.

Pharmacological investigations of percain, by O. Gebner and J. Nanheimer. *Schmerz Narkose-Anaesthesia,* May, 1930.

The article gives details of a number of experiments on both cold and warm-blooded animals, as well as some clinical comparisons between the actions of percain and novocain. The summary of conclusions at which the authors arrive is :

1. Percain has a practically neutral reaction in watery solution, but is incompatible with alkali.

2. Tested on various animals it is from 7 to 50 times as effective as novocain. The action of percain is sooner started and lasts longer than that of novocain.

3. Percain acts on the isolated frog's heart more than novocain; suprarenin is able to relieve the diastolic inhibition of percain.

4. Percain has a direct action on the contractile substance of the organs with unstriated muscle.

5. Percain contracts the bloodvessels of the frog. This action is slow.

6. In weak concentrations percain does not influence the vascular channels of warm-blooded animals, or slightly dilates them. In higher concentrations (1 : 500; 1 : 100) it exerts a reversible contraction. Percain acts excellently with suprarenin.

7. Percain is two hundred times as effective a surface anæsthetic as novocain on the guinea-pig's cornea.

On somnifen—urethan—magnesium narcosis for surgical operations. By Dr. H. Hilarowicz and Dr. Mieczyslaw. *Schmerz Narkose-Anaesthesia,* March 15, 1930.

The authors first tried their combination of drugs on dogs. The agent is given either intra-venously or intra-muscularly, a smaller dose being needed with the former route. Somnifen is described as

containing in 1 c.c. - Allylisopropylbarbituric acid 0.1 gr. and the same amount of diethlybarbituric acid. The last-named drug is veronal, which by itself does not produce any deep sleep in dogs. Combined with the former drug, which can by itself produce narcosis, veronal furnishes an excellent period of deep and long-lasting unconsciousness. Used as an introduction to anæsthesia the safe dose for a human being appears to be not more than 5 c.c., usually 2 to 4 c.c. being enough. Used in this way the drug is free from immediate danger and from all after effects and the post-operative sleep is not too prolonged. Experimentally somnifen was shown to have the power if given in big doses of lowering the blood-pressure and repressing the breathing.

The same was true to a less extent of urethan. On patients the authors employed mixtures of 2.2 to 4.4 c.c. somnifen, 2 to 5 gr. urethan, 0.5 to 3 gr. mag. sulph., given in some cases into muscle, in some intra-venously. Details are given of 34 cases, the operations being of various kinds and including laparotomies. The authors noted sometimes perfect relaxation and stillness without abolition of the conjunctional reflex. There was occasionally excitement during the recovery period.

Experimental shock. By ALFRED BLALOCK in *Archives of Surgery*, June, 1930.

The author describes the various theories held to account for secondary shock, particularly that one based on Dale's work which supposes a body generated by trauma to muscle, that body having the power to cause a lowering of the blood pressure. The experiments carried out by Blalock were all performed on dogs anæsthetized by barbital. They were undertaken in order to test the various theories advanced to explain the initiating agent in the development of low blood pressure after gross trauma. Some of Blalock's chief conslusions are as follows :

1. The blood pressure could not be reduced to a shock level by trauma to one of the posterior extremities without causing the loss of a sufficient part of the blood volume into the traumatized area to account for the decline in the pressure. There was a greater proportionate loss of plasma than of red cells, and this accounts for the concentration of the blood elsewhere.

2. The injection of histamine into the patent fermoral artery of a thigh which was tightly constricted by a tourniquet in some instances caused a fall in blood pressure. After the uppermost part of the femur had been removed, the injection of histamine into the artery did not cause a decline in pressure if the tourniquet was properly applied.

3. A fall in blood pressure to a low level was produced by trauma to an extremity, the thigh of which was constricted by a tourniquet except for the fermoral artery. A sufficient amount of hæmorrhage

occurred into the traumatized part to account for the decline in the blood pressure. This occurred whether the upper part of the femur had, or had not been removed.

4. The transfusion of blood from one dog in which a low blood pressure has been produced by trauma to an extremity to another dog in which a low blood pressure had been produced by a loss of blood, either outside the body or into the tissues of the body, resulted in an elevation of the blood pressure in the recipient.

The experiments presented offer no evidence that trauma to an extremity produces a toxin which causes a general dilatation of capillaries with an increase in capillary permeability and a general loss of fluid from the blood therein. Neither do they lend support to the theories of acidosis, acapnia, vasomotor exhaustion and other supposed causes of shock.

Definite conclusions, the author states, cannot be drawn from these experiments as to the mechanism of the production of shock in man.

SECTION OF ANÆSTHETICS.

(Royal Society of Medicine.)

THE Meeting on March 7th, Mr. R. E. Apperly in the Chair, was occupied by two papers, one on Spinal Analgesia with Spinocain. The other, by Dr. Howard-Jones, on percain, was to a large extent the same as that which we have printed fully in the last and the present number of this Journal. The spinocain paper was read by Mr. C. Donald of the London Hospital. It was based on a series of 150 carefully recorded cases. Mr. Donald discussed Pitkins claims to :—

1. Minimum of toxcity.
2. Absolute control over height of analgesia.
3. Absolute maintenance of blood-pressure.
4. Almost absolute freedom from post-operative complications.

As regards controllibility, the author stated that the factors noted were :—

1. Amount of spinocain injected.
2. Low specific gravity.
3. Indiffusibility.
4. The site of injection.

On these factors the criticisms were that the dose injected has a definite relation to the height of analgesia. There is less analgesia from 2 c.c. of spinocain than from 200 mgrm. of crystalline novocain, the amount contained in 2 c.c. of spinocain. This suggests that the claim for slow absorption is valid. One can certainly inject with safety larger quantities of novocain in the guise of spinocain than as itself, and in this way we have gone up to 3.75 c.c. which is equal to 375 mgrm. of novocain. Our results show clearly that the same dose has different results in different patients. For example 2 c.c. of spinocain have given the most diverse results, with analgesia varying from below the umbilicus to the neck. A dose of 3 c.c. gave in most cases analgesia to the transverse nipple line, but in others there has been a variation from the xiphisternum to the neck.

With regard to the lightness of the solution and the use of the Trendelenburg position to prevent upward spread, our experience has been that while outside the canal spinocain behaves as a light solution it does not so behave when introduced within the theca. The only noticeable feature of injecting in the Trendelenburg position is that analgesia is produced more slowly. Nor can we agree that the solution is indiffusible to the degree stated. The claim that it remains in the same bulk as injected is untenable. Spinocain is no more controllable than novocain. Our experience suggests that controllibility does not

matter. In our opinion there are only two factors of importance. The first is the quantity of analgesic injected. With regard to the fall of blood pressure, which we have seen repeatedly, although Pitkin claims an absolute freedom from it, the cause is as obscure as the cause of widespread analgesia.

Dosage is usually given in proportion to body weight. There is no doubt that this is erroneous. Those who exhibited analgesia beyond the average for the dose were the old, the very ill, and the fat and flabby type of person. We can certainly uphold the claim of freedom from complications with Pitkin's solution, at least as compared with stovain. As regards failures, Mr. Donald suggested that they might sometimes be due to deterioration of the analgesic agent when used from ampoules, owing to the heat required to seal the ampoule.

Finally technique, no doubt, accounts for some, for intraspinal injection is a delicate proceeding, slight alteration in the position of the needle causing some of the injection to be made extra-durally.

At the meeting on May 2nd, Dr. R. J. Clausen read a paper on ethylene anæsthesia. After referring to the history of its use and to its chemical and physical properties, Dr. Clausen discussed his own experience with 371 administrations, 92 of which were for dental operations.

In five cases the administration lasted over two hours. He had usually employed a McKesson apparatus and his average percentage of oxygen given with the ethylene was 20. The amount of ethylene he used was about 60 gallons per hour. For abdominal operations he had generally added small amounts of ether. In 26 abdominal cases he had used an average of 2½ ounces of ether per case. He had never had to abandon ethylene for another method in the course of an operation. The anæsthesia was followed by a prolonged period of analgesia and recovery was just as good, he thought, as from nitrous oxide. There had been in his series no death which could be attributed to the anæsthetic. The drawbacks to ethylene were smell, hæmorrhage and risk of fire. He dealt with the smell by means of an exhaust pipe leading the expired gases away from the patient, preferably to the outside of the theatre. The smell could also be avoided by using a closed circuit with carbon dioxide absorption.

Hæmorrhage was, he thought, definitely though not essentially increased by inhalation of ethylene. The danger of fire, or explosion, was chiefly from naked lights or flames, and this cause could obviously be easily avoided. The phenomenon of static electricity causing an explosion appeared to be less likely in this country than in the United States of America. In the discussion which followed, the general opion maintained was that ethylene did not present sufficient advantage over nitrous oxide to compensate for its drawbacks.

REVIEWS.

La Rachianesthésie. Sa valeur et sa place actuelle dans la pratique. E. FORQUE and A. BASSET, pp. 222, Price 30 fr., 120 Boulevard Saint Germain, Paris, 1930.

The authors provide a comprehensive view of spinal analgesia. They begin with a short chapter of history and then enter on a long discussion of the physiological problems involved in spinal analgesia. Here they remark with truth that the physiologists themselves have contributed but little to our knowledge of spinal anæsthetics, which they say is only natural since it is difficult to reproduce in animals the conditions in which spinal analgesia is employed for human beings. It is almost entirely to clinical investigators that we owe such knowledge as we have of the physiology of spinal analgesia. The work of physicians who have sought to introduce medicinal substances into the cerebrospinal space has taught lessons of value to the surgeon who uses spinal analgesia. The authors believe that the considerable variations in technique among those who use spinal anæsthetics is owing to the absence of a commonly recognised physiological mechanism of spinal analgesia. It is this which they are anxious to establish in this physiological chapter.

First they discuss the effects of lumbar puncture apart from any anæsthetic action, and then the questions of (1) the mechanism and the conditions of the progress upwards of the anæsthetic solution; (2) the nervous elements on which the effects are produced; (3) the manner and the time in which the anæsthetic is eliminated; (4) the behaviour of the arachnoid to the presence of the anæsthetic and of its solvent. The authors believe in fine needles and slow injection as important items in avoiding headache and giddiness subsequent to puncture. They do not agree with Le Filliatre in the advisability of removing large quantities of cerebrospinal fluid, thinking that generally speaking 10 c.c. is about the maximum amount to be allowed to escape. They do not approve of barbotage. The height of analgesia is determined chiefly by the dose injected and the force with which it is injected, in the authors' opinion, and their whole discussion of this and of the behaviour generally of injected solutions appears to us logical and sensible in the highest degree. Details are given, based on accurate observations, of the time taken for elimination of the various anæsthetics used in spinal work. Some

interesting information is given as to the frequency of employment of spinal methods in the various countries of Europe.

As regards the applicability of spinal analgesia the authors hold moderate views and deprecate its use for most operations above the umbilicus, although they often employ it for gastro-enterostomy.

The authors use habitually novocaine in 8 per cent solution in preference to any other spinal anæsthetics and they prefer to insert the needle in between the fourth and fifth lumbar spines.

The failures, accidents and occasional sequelæ of spinal analgesia are fully considered. No mention is made of spinocain or percain, both of which presumably had not yet appeared when this book was being written. It is a most readable volume, well produced, with a few diagramatic illustrations, and written with the lucidity we have come to expect from French authors.

"*Hickman Centenary Exhibition*, 1930."

Under the above title the Welcome Historical Medical Museum has issued an attractive volume of Hickman souvenirs. They have accompanied it with an account of all the centerary celebrations, so that the whole collection makes a perfectly complete reminder of what Hickman did and what has been done to commemorate it. In this volume the Hickman exhibits are reproduced, and there is a plate and preface from Dr. John D. Comrie, and a foreword from Dr. Dudley Buxton. The photographic illustrations include Hickman's house, his door-plate and his grave, and a number of MSS. reproductions of letters, including Hickman's appeal to Charles X in 1828.

CORRESPONDENCE.

To the Editor, The British Journal of Anæsthesia.

DEAR SIR,

I am moved to provide controversy by the Editorial comment headed "Machines and Men" which appeared in your last issue. As a modest member of the younger generation of anæsthetists who, with their marvellous array of tubes, taps and mechanical devices excite your envy. I am goaded into rebellion by your shocking impeachment of our clinical acumen. *Cateris paribus,* clinical acumen is a product of age and experience, and your accusation is an unmanly weapon to use in the chastisement of youthful enthusiasm.

I view your tendency to deplore modern mechanical methods with less concern, for there are naturally and unfortunately many abuses of those principles which I believe to be fundamentally sound. In the older methods of administrating inhalation anæsthetics the place of the modern machine was taken by the anæsthetist himself and, however great his clinincal acumen, he was likely to be so busy in maintaining his functions as a machine that he was hardly aware of the condition of his patient. If, on the other hand, he wished to devote his entire attention to his patient, it was at the expense of his function as a machine with the result that the course of the anæsthetic was incidently upset.

Contrast this picture with that of the modern anæsthetist who, equipped with machinery capable of delivering constant and controllable supplies of anæsthetic, is free to observe his patient closely, to extend the scope of his observations, and to anticipate the emergencies of anæsthesia in a degree of efficiency otherwise impossible. Moreover, with the perfection of mechanical adjuncts, more of the emergencies of anæsthesia are now controllable. The welter of variables with which the anæsthetist has to contend are every day being reduced by better and more efficient machines and the greatest variable of all namely, the patient, is being more closely analysed and his welfare more carefully considered than ever before.

In a word, if I may adopt your final metaphor to my service, it is of no use training the man behind the gun and making him count if you are going to make him throw his own shells.

I remain,
Yours truly,
ROBOT.

[We have much pleasure in publishing the above letter, the writer of which has enclosed his name, both because of its argument and because we know the writer to be a highly skilled exponent of the latest forms of mechanical anæsthetic administration.—Ed.]